REMARKS

A Request for Continued Examination (RCE) is submitted herewith.

Claims 2-13 and 15-21 are all the claims presently pending in the application. Claim 3 is amended to more particularly define the claimed invention and raise a new issue to avoid a First Office Action Final Rejection. Claims 19-21 are added to claim additional features of the invention. Claim 14 is canceled. Claim 2 is withdrawn. No new matter is added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 4-6, 12, and 13 stand rejected under 35 U.S.C. § 112, first paragraph as allegedly failing to comply with the written description requirement. Applicants note that claim 15 is also mentioned within this rejection, but is not alleged by the Examiner as being rejected. To expedite prosecution, Applicants assume that the Examiner intended to reject claim 15 35 U.S.C. § 112, first paragraph.

Claims 4-6 stand rejected under 35 U.S.C. § 112, second paragraph as being allegedly indefinite.

With respect to the prior art, claims 3-11 and 15-18 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Kamio et al. (U.S. Patent Publication No. 2002/0056292 A1) in view of Sarkar (U.S. Patent No. 4,599,098), Walczak (U.S. Patent Publication No. 2003/0221459 A1), Glodis et al. (U.S. Patent No. 6,105,396), and Shimotakahara et al. (U.S. Patent Publication No. 2003/0084686 A1). Claims 12 and 13 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Kamio in view of Sarkar, Walczak, Glodis, and Shimotakahara, and further in view of Chervenak et al. (U.S. Patent No. 5,558,692).

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

An exemplary aspect of the claimed invention (e.g. as recited in claim 3) is directed to a method of sintering a rod-shaped porous glass base material in a furnace core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating furnace and a preheating section that is surrounded by an insulating member of the heating

furnace, the insulating member serving with the furnace core tube to enclose the heater, the preheating section extending from an upper edge of the insulating member to an upper edge of the heater in the heating furnace, the method including hanging the rod-shaped porous glass base material in the furnace core tube, heating the preheating sections of the furnace core tube by heating the heater to a sintering temperature, and lowering the rod-shaped porous glass base material through the preheating section and the heating section, an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being greater than or equal to 4.5 hours, the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the heating section, the rod-shaped porous glass base material thereby being sintered into a transparent glass.

In a conventional method of sintering a rod-shaped porous glass base material, a slight insufficiency in an application of thermal energy to the rod-shaped porous glass base material may result in a chain reaction of events resulting in core displacement of the rod-shaped porous glass base material and elliptical deformation of the rod-shaped porous glass base material's cross-sectional shape. This largely is due to temperature variations occurring within the rod-shaped porous glass bade material while heating. These displacements and deformations result in the rod-shaped porous glass base material being subject to connection loss. (Application at paragraphs [0004]-[0006]).

On the other hand, an exemplary embodiment of the claimed invention may include a method of sintering a rod-shaped porous glass base material in a furnace core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating furnace and a preheating section that is surrounded by an insulating member of the heating furnace, the insulating member serving with the furnace core tube to enclose the heater, the preheating section extending from an upper edge of the insulating member to an upper edge of the heater in the heating furnace, the method including lowering the rod-shaped porous glass base material through the preheating section and the heating section, an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being greater than or equal to 4.5 hours, the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having

temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the heating section, the rod-shaped porous glass base material thereby being sintered into a transparent glass. (Application at paragraphs [0014]-[0015]).

This exemplary feature may provide a method of sintering a rod-shaped porous glass base material in which core displacement of the rod-shaped porous glass base material and elliptical deformation of the rod-shaped porous glass base material's cross-sectional shape is reduced. (Application at paragraph [0011]).

II. THE 35 U.S.C. § 112, FIRST PARAGRAPH REJECTIONS

A. "large-diameter" or "large mass"

The Examiner alleges that no support could be found "for the newly claimed material be (sic) 'large-diameter' or 'large mass'." (Office Action at page 2, middle of page). However, Applicants note that those having ordinary skill in the art at the time of the invention would have found that the original specification indeed provides support for the terms "large-diameter porous glass base material" and "large-mass porous glass base material".

Specifically, these terms would have been well understood by those having ordinary skill in the art at the time of the invention. As such, one of ordinary skill in the art at the time of the invention would have found that, despite the lack of any explicit mention of the above-referenced terms in the original specification, "large-diameter porous glass base material" and "large-mass porous glass base material" are clearly supported by the original specification and drawings.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

B. Claims 12 and 13

The Examiner alleges that "[i]t appears that the values of 0.1 and 0.05 were random points picked from workable ranges." The Examiner then specifically references Figures 4 and 5 to state that "it appears applicant only has support for values such as 0.0052 and 0.0009 for the core displacement ratio, and values 0.005, 0.0031, etc. for the deformation ratio." (Office Action at page 2, middle of page).

To expedite prosecution, claims 12 and 13 are amended to clarify the core displacement ratio and the deformation ratio. However, Applicants respectfully direct the Examiner's attention

to paragraphs [0024] and [0026] of the original specification, in which claims 12 and 13 are clearly supported, and the values included therein are clearly considered to be part of the invention at the time of the invention.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

C. Claim 15

The Examiner alleges that "[t]here is no support for the claim 15 limitation that the insulation surrounds an upper portion." (Office Action at page 2, bottom of page).

However, Applicants respectfully direct the Examiner's attention to paragraph [0017] of the original specification, in which the subject matter of claim 15 is clearly supported.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

III. THE 35 U.S.C. § 112, SECOND PARAGRAPH REJECTION

The Examiner alleges that "[i]t is unclear what standards for 'large-diameter' or 'large mass' are." (Office Action at page 3, middle of page). However, Applicants note that those having ordinary skill in the art at the time of the invention would have clearly understood the terms "large-diameter porous glass base material" and "large-mass porous glass base material".

Specifically, the meaning of these terms would have been well understood by those having ordinary skill in the art at the time of the invention. As such, despite the lack of any explicit mention of the above-referenced terms in the original specification, one of ordinary skill in the art at the time of the invention would have clearly understood "large-diameter porous glass base material" and "large-mass porous glass base material".

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

IV. THE PRIOR ART REJECTIONS

A. The Alleged Kamio, Sarkar, Walczak, Glodis, and Shimotakahara Combination

Kamio discloses a method for sintering a porous-glass material to form a glass base material. (Kamio at Abstract). Sarkar discloses low signal attenuation optical fibers and methods

for making such fibers. (Sarkar at Abstract). Walczak discloses a method of producing a doped optical fiber preform. (Walczak at Abstract). Glodis discloses a large optical preform. (Glodis at Abstract). Shimotakahara discloses a process for producing an optical fiber preform. (Shimotakahara at Abstract). The Examiner alleges that the combination of Kamio, Sarkar, Walczak, Glodis, and Shimotakahara makes the claimed invention obvious.

However, even assuming (arguendo) that one of ordinary skill in the art would have combined Kamio, Sarkar, Walczak, Glodis, and Shimotakahara (no less than five disparate references found from a keyword search!), the resultant combination fails to teach each and every element of the claimed invention. Specifically, Kamio, Sarkar, Walczak, Glodis, and Shimotakahara – either applied individually or in combination – fail to teach or suggest a method of sintering a rod-shaped porous glass base material in a furnace core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating furnace and a preheating section that is surrounded by an insulating member of the heating furnace, the insulating member serving with the furnace core tube to enclose the heater, the preheating section extending from an upper edge of the insulating member to an upper edge of the heater in the heating furnace, "*the method comprising . . . lowering said rod-shaped porous glass base material through said preheating section and said heating section, an entirety of said rod-shaped porous glass base material being lowered through said preheating section in a period of time being greater than or equal to 4.5 hours, said entirety of said rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of said rod-shaped porous glass based material begins in said heating section, said rod-shaped porous glass base material thereby being sintered into a transparent glass*", as recited, for example, in claim 3. (Application at paragraphs [0014]-[0015]).

As previously mentioned, this exemplary feature may provide a method of sintering a rod-shaped porous glass base material in which core displacement of the rod-shaped porous glass base material and elliptical deformation of the rod-shaped porous glass base material's cross-sectional shape is reduced. (Application at paragraph [0011]).

The Examiner alleges that "Figure 1 of Kamio clearly shows sintering material 12 by lowering the base material into a heating furnace (24+26)." (Office Action at page 4, fourth paragraph). However, Kamio clearly fails to teach or suggest an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being

greater than or equal to 4.5 hours, and the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the heating section.

To make up for the deficiencies of Kamio, the Examiner applies Sarkar. The Examiner alleges that column 9, lines 26-32 of Sarkar teaches the downfeed rate to be a critical parameter. (Office Action at page 5, sixth paragraph).

However, Sarkar clearly fails to teach or suggest an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being greater than or equal to 4.5 hours, and the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the heating section. Thus, the Examiner fails to make up for the aforementioned deficiencies of Kamio by applying Sarkar, and fails to make a *prima facie* case of obviousness.

To make up for the deficiencies of the alleged Kamio and Sarkar combination, the Examiner applies Walczak. The Examiner alleges that paragraphs [0073], [0078], and [0082] of Walczak teach preheating in the preform consolidation art and preferred sintering times. (Office Action at page 5, fifth and seventh paragraphs).

However, Walczak clearly fails to teach or suggest an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being greater than or equal to 4.5 hours, and the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the heating section. Thus, the Examiner fails to make up for the aforementioned deficiencies of the alleged Kamio and Sarkar combination by applying Walczak, and fails to make a *prima facie* case of obviousness.

To make up for the deficiencies of the alleged Kamio, Sarkar, and Walczak combination, the Examiner applies Glodis. The Examiner alleges that column 3, lines 25-35 of Glodis teaches

"that economy of scale is an important consideration in the fiber preform art . . . ." (Office Action at page 6, first paragraph).

However, Glodis clearly fails to teach or suggest an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being greater than or equal to 4.5 hours, and the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the heating section. Thus, the Examiner fails to make up for the aforementioned deficiencies of the alleged Kamio, Sarkar, and Walczak combination by applying Glodis, and fails to make a *prima facie* case of obviousness.

To make up for the deficiencies of the alleged Kamio, Sarkar, Walczak, and Glodis combination, the Examiner applies Shimotakahara. The Examiner alleges that paragraph [0027] of Shimotakahara teaches "a sintering time of 6-12 hours." (Office Action at page 5, final paragraph).

However, Shimotakahara clearly fails to teach or suggest an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being greater than or equal to 4.5 hours, and the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the heating section. Thus, the Examiner fails to make up for the aforementioned deficiencies of the alleged Kamio, Sarkar, Walczak, and Glodis combination by applying Shimotakahara, and fails to make a *prima facie* case of obviousness.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

B. The Chervenak Reference

To make up for the deficiencies of the alleged Kamio, Sarkar, Walczak, Glodis, and Shimotakahara combination, the Examiner applies Chervenak. Chervenak discloses an apparatus and method for measuring preform diameter and runout during manufacture of the preform.

(Chervenak at Abstract). The Examiner alleges that the combination of Kamio, Sarkar, Walczak, Glodis, Shimotakahara, and Chervenak makes the claimed invention obvious.

However, even assuming (arguendo) that one of ordinary skill in the art would have combined Kamio, Sarkar, Walczak, Glodis, Shimotakahara, and Chervenak (no less than six disparate references found from a keyword search!), the resultant combination fails to teach each and every element of the claimed invention. Specifically, Kamio, Sarkar, Walczak, Glodis, Shimotakahara, and Chervenak – either applied individually or in combination – fail to teach or suggest a method of sintering a rod-shaped porous glass base material in a furnace core tube, the furnace core tube having a heating section that is concentrically surrounded by a heater of a heating furnace and a preheating section that is surrounded by an insulating member of the heating furnace, the insulating member serving with the furnace core tube to enclose the heater, the preheating section extending from an upper edge of the insulating member to an upper edge of the heater in the heating furnace, "*the method comprising . . . lowering said rod-shaped porous glass base material through said preheating section and said heating section, an entirety of said rod-shaped porous glass base material being lowered through said preheating section in a period of time being greater than or equal to 4.5 hours, said entirety of said rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of said rod-shaped porous glass based material begins in said heating section, said rod-shaped porous glass base material thereby being sintered into a transparent glass*", as recited, for example, in claim 3. (Application at paragraphs [0014]-[0015]).

The Examiner alleges that column 1, lines 11-34 of Chervenak teaches "that fiber geometry must be controlled to high tolerances and that a 0.1 mm deviation in a preform can cause an out of tolerance fiber, and that concentricity of core and clad are typically controlled geometry specifications . . . ." (Office Action at page 11, final paragraph).

However, Chervenak clearly fails to teach or suggest an entirety of the rod-shaped porous glass base material being lowered through the preheating section in a period of time being greater than or equal to 4.5 hours, and the entirety of the rod-shaped porous glass based material being preheated, having a temperature in a radial direction being evenly distributed, and having temperatures in a cross section of the radial direction being minimally different before vitrification of an outer portion of the rod-shaped porous glass based material begins in the

heating section. Thus, the Examiner fails to make up for the aforementioned deficiencies of the alleged Kamio, Sarkar, Walczak, Glodis, and Shimotakahara combination by applying Chervenak, and fails to make a *prima facie* case of obviousness.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

V. NEW CLAIMS

New claims 19-21 are added to claim additional features of the invention and to provide more varied protection for the claimed invention. These claims are independently patentable because of the novel and nonobvious features recited therein.

Applicants submit that the new claims are patentable over the cited prior art references at least for analogous reasons to those set forth above.

VI. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicants submit that claims 2-13 and 15-21, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Applicants believe this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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